

CLAIMS

1. A method of generating or modifying a programme signal to provide protection against copying on a programme recording device, the method comprising the steps of:
  - 5 receiving a programme signal or information for generating a programme signal divided into lines of information, the signal having horizontal synchronisation pulses and vertical synchronisation pulses for
  - 10 synchronising the programme on the screen of a receiver;  
adding a pulse into the programme signal during the horizontal blanking interval of lines that contain picture information and into lines in the vertical blanking region;
  - 15 adding a first modulation signal to vertical synchronisation pulses of the programme signal;  
adding a second modulation signal to lines of picture information in the vicinity of the vertical blanking region at the bottom of a frame of the programme signal;
  - 20 wherein the pulse, and the first and second modulation signals added to the programme signal are sufficient such that when the signal is copied by the recording device, interference is produced in the reproduction of the copied signal that is not visible in
  - 25 the reproduction of an uncopied programme signal.
2. A method according to claim 1 comprising amplifying the picture information in lines of the programme signal to increase the brightness of the signal such that the darkening effect of adding the pulse, and the first and
- 30 second modulated signals is reduced.

3. A method according to claim 1 or 2 wherein the pulse is added to the horizontal blanking interval adjacent the horizontal synchronisation pulse.

5 4. A method according to claim 1 to 3 wherein the pulse is added to the horizontal blanking interval such that the width of the horizontal synchronisation pulse is reduced.

10 5. A method according to any previous claim in which the height of the pulse is in the range 0.5V to 1.5V above the blanking level.

6. A method according to any previous claim in which the height of the pulse is 1V.

7. A method according to any previous claim in which the width of the pulse is in the range 0.2 $\mu$ s to 4 $\mu$ s.

15 8. A method according to any previous claim in which the width of the pulse is 1.2 $\mu$ s.

9. A method according to any previous claim wherein the pulse is positioned such that the width of the horizontal synchronisation pulse is reduced by 0 $\mu$ s to 2 $\mu$ s.

20 10. A method according to any previous claim wherein the pulse is positioned such that the width of the horizontal synchronisation pulse is reduced by 0.8 $\mu$ s.

25 11. A method according to any previous claim comprising adding the pulse to the horizontal blanking interval such that one or more of the height, the width, and the position of the pulse varies across the lines of the programme signal.

12. A method according to any previous claim wherein the first modulation signal has a frequency in the range 100kHz to 6500kHz.

5 13. A method according to any previous claim wherein the first modulation signal has a frequency of 400kHz.

14. A method according to any previous claim wherein the height above the blanking level to which the first modulation signal extends is 250mV.

10 15. A method according to any previous claim wherein the first modulation signal is a square wave.

16. A method according to any previous claim wherein the first modulation signal is a sine wave.

17. A method according to any previous claim wherein the first modulation signal is a saw tooth function.

15 18. A method according to any previous claim wherein the frequency of the first modulation signal is varied between different vertical synchronisation pulses.

20 19. A method according to any previous claim wherein the second modulation signal has a frequency in the range 10kHz to 2MHz.

20. A method according to any previous claim wherein the second modulation signal has a frequency of 220kHz.

25 21. A method according to any previous claim wherein the second modulation signal has an amplitude in the range 40mV to 150mV.

22. A method according to any previous claim wherein the second modulation signal has an amplitude of 70mV.

23. A method according to any previous claim wherein the second modulation signal is a square wave.

5 24. A method according to any previous claim wherein the second modulation signal is a sine wave.

25. A method according to any previous claim wherein the second modulation signal is a saw tooth function.

10 26. A method according to any previous claim wherein the second modulation signal is added to between 5 and 15 lines of picture information prior to the vertical blanking section.

15 27. A method according to any previous claim wherein the second modulation signal is added to 12 lines of picture information prior to the vertical blanking section.

20 28. A method according to any previous claim wherein at least one of the number of lines to which the second modulation signal is added, the amplitude of the modulation signal, and the frequency of the modulation signal is varied from frame to frame of the programme signal.

25 29. A method according to any previous claim wherein the pulse, and first and second modulation signals are added to the programme signal in dependence on information relating to the type of receiver on which the programme signal is to be viewed.

30. A method according to any of claims 2 to 29 wherein the picture information is amplified by adding 100mV to the region of the signal comprising the picture information.

5 31. A method according to any of claims 2 to 29 wherein the picture information is amplified by multiplying the region of the signal comprising the picture information by a scaling factor.

10 32. A method according to any of claims 2 to 29 wherein the picture information is amplified by multiplying the region of the signal comprising the picture information by an amount that varies in dependence on information relating to the type of receiver on which the programme signal is to be viewed.

15 33. A method of generating or modifying a programme signal to provide protection against copying on a recording device, the method comprising:

receiving a programme signal or information for generating a programme signal divided into lines of information, the signal having horizontal synchronisation pulses and vertical synchronisation pulses for synchronising the programme on the screen of a receiver; and performing two of following three steps:

25 adding a pulse into the programme signal during the horizontal blanking interval of lines that contain picture information and into lines in the vertical blanking region;

adding a first modulation signal to vertical synchronisation pulses of the programme signal;

30 adding a second modulation signal to lines of picture information in the vicinity of the vertical blanking region at the bottom of a frame of the programme signal;

wherein two of either the pulse, and the first and second modulation signals added to the programme signal are sufficient such that when the signal is copied by a recording device, interference is produced in the reproduction of the copied signal that is not visible in the reproduction of an uncopied programme signal.

34. Apparatus for modifying a programme signal to provide protection against copying on a recording device, the apparatus comprising:

an input for receiving a programme signal divided into lines of information, the signal having horizontal synchronisation pulses and vertical synchronisation pulses for synchronising the programme on the screen of a receiver;

a first adder for adding a pulse into the programme signal during the horizontal blanking interval of lines that contain picture information and into lines in the vertical blanking region;

a second adder for adding a first modulation signal to vertical synchronisation pulses of the programme signal;

a third adder for adding a second modulation signal to lines of picture information in the vicinity of the vertical blanking region at the bottom of a frame of the programme signal; and

an output for outputting a modified programme signal; wherein the pulse, and the first and second modulation signals added to the programme signal are sufficient such that when the modified programme signal is copied by a recording device, interference is produced in the reproduction of the copied signal that is not visible in the reproduction of an uncopied programme signal.

35. An apparatus according to claim 34 comprising an amplifier for amplifying the picture information in lines of the programme signal to increase the brightness of the signal such that the darkening effect of adding the pulse, and the first and second modulated signals is reduced.

36. An apparatus according to claim 35 wherein the amplifier comprises:

a brightness separator for extracting a brightness signal from the received programme signal;

an analyser for analysing the brightness information and determining, in conjunction with information describing the receiver on which the modified programme signal is to be viewed, an amplification amount by which the brightness signal is amplified in the amplifier;

a forth adder, coupled to the first to third adders, for receiving the modified programme signal and adding to it the amplified brightness signal.

37. An apparatus according to claims 34 to 36 wherein the first adder is operable to add the pulse to the horizontal blanking interval adjacent the horizontal synchronisation pulse.

38. An apparatus according to claims 34 to 37 wherein the first adder is operable to add the pulse to the horizontal blanking interval such that the width of the horizontal synchronisation pulse is reduced.

39. An apparatus according to claims 34 to 38 wherein the first adder is operable to add the pulse with a height in the range 0.5V to 1.5V above the blanking level.

40. An apparatus according to claims 34 to 39 wherein the first adder is operable to add the pulse with a height of 1V.

5 41. An apparatus according to claims 34 to 40 wherein the first adder is operable to add the pulse with a width in the range  $0.2\mu\text{s}$  to  $4\mu\text{s}$ .

42. An apparatus according to claims 34 to 41 wherein the first adder is operable to add the pulse with a width of  $1.2\mu\text{s}$ .

10 43. An apparatus according to claims 34 to 42 wherein the first adder is operable to position the pulse such that the width of the horizontal synchronisation pulse is reduced by  $0\mu\text{s}$  to  $2\mu\text{s}$ .

15 44. An apparatus according to claims 34 to 43 wherein the first adder is operable to position the pulse such that the width of the horizontal synchronisation pulse is reduced by  $0.8\mu\text{s}$ .

20 45. An apparatus according to claims 34 to 44 wherein the first adder is operable to add the pulse to the horizontal blanking interval such that one or more of the height, the width, and the position of the pulse varies across the lines of the programme signal.

25 46. An apparatus according to claims 34 to 44 wherein the second adder is operable to add the first modulation signal having a frequency in the range 100kHz to 6500kHz.

47. An apparatus according to claims 34 to 45 wherein the second adder is operable to add the first modulation signal having a frequency of 400kHz.



48. An apparatus according to claims 34 to 46 wherein the second adder is operable to add the first modulation signal having a height that extends to 250mV above the blanking level.

5     49. An apparatus according to claims 34 to 48 wherein the second adder is operable to add a square wave as the first modulation signal.

10    50. An apparatus according to claims 34 to 48 wherein the second adder is operable to add a sine wave as the first modulation signal.

51. An apparatus according to claims 34 to 49 wherein the second adder is operable to add a saw tooth function as the first modulation signal.

15    52. An apparatus according to claims 34 to 51 wherein the second adder is operable to vary the frequency of the first modulation signal between different vertical synchronisation pulses.

20    53. An apparatus according to claims 34 to 51 wherein the third adder is operable to add the second modulation signal having a frequency in the range 10kHz to 2MHz.

54. An apparatus according to claims 34 to 52 wherein the third adder is operable to add the second modulation signal having a frequency of 220kHz.

25    55. An apparatus according to claims 34 to 53 wherein the third adder is operable to add the second modulation signal having an amplitude in the range 40mV to 150mV.

56. An apparatus according to claims 34 to 55 wherein the third adder is operable to add the second modulation signal having an amplitude of 70mV.

5 57. An apparatus according to claims 34 to 56 wherein the second modulation signal is a square wave.

58. An apparatus according to claims 34 to 57 wherein the third adder is operable to add a sine wave as the second modulation signal.

10 59. An apparatus according to claims 34 to 58 wherein the third adder is operable to add a saw tooth function as the second modulation signal.

15 60. An apparatus according to claims 34 to 59 wherein the third adder is operable to add the second modulation signal to between 5 and 15 lines of picture information prior to the vertical blanking section.

61. An apparatus according to claims 34 to 60 wherein the third adder is operable to add the second modulation signal to 12 lines of picture information prior to the vertical blanking section.

20 62. An apparatus according to claims 34 to 61 wherein the third adder is operable to add the second modulation signal such that at least one of the number of lines to which the second modulation signal is added, the amplitude of the modulation signal, and the frequency of the  
25 modulation signal is varied from frame to frame of the programme signal.

63. An apparatus according to claims 34 to 62 wherein one or more of the first to third adders add the pulse, and

the first and second modulation signals to the programme signal in dependence on information relating to the type of receiver on which the programme signal is to be viewed.

5       64. An apparatus according to any of claims 35 to 63 wherein the amplifier is operable to add 100mV to the region of the signal comprising the picture information.

65. An apparatus according to any of claims 35 to 63 wherein the amplifier is operable to amplify the picture information by multiplying the region of the signal  
10       comprising the picture information by a scaling factor.

66. An apparatus according to any of claims 35 to 63 wherein the amplifier is operable to amplify the picture information by multiplying the region of the signal comprising the picture information by an amount that  
15       varies in dependence on information relating to the type of receiver on which the programme signal is to be viewed.

67. Apparatus for modifying a programme signal to provide protection against copying on a recording device, the apparatus comprising:  
20       an input for receiving a programme signal divided into lines of information, the signal having horizontal synchronisation pulses and vertical synchronisation pulses for synchronising the programme on the screen of a receiver;

25       an output for outputting a modified programme signal; and any two of the following:

      a first adder for adding a pulse into the programme signal during the horizontal blanking interval of lines that contain picture information and into lines in the  
30       vertical blanking region;

a second adder for adding a first modulation signal to vertical synchronisation pulses of the programme signal;

5 a third adder for adding a second modulation signal to lines of picture information in the vicinity of the vertical blanking region at the bottom of a frame of the programme signal; and

10 wherein the two of the pulse, and the first and second modulation signals added to the programme signal are sufficient such that when the modified programme signal is copied by a recording device, interference is produced in the reproduction of the copied signal that is not visible in the reproduction of an uncopied programme signal.

15 68. A modified programme signal comprising a signal divided into lines of information, the signal having horizontal synchronisation pulses and vertical synchronisation pulses for synchronising the programme on the screen of a receiver;

20 the modified signal comprising a pulse during the horizontal blanking interval of lines that contain picture information and into lines in the vertical blanking region, the pulse being in addition to the horizontal synchronisation pulse;

25 a first modulation signal in vertical synchronisation pulses of the programme signal;

a second modulation signal in lines of picture information in the vicinity of the vertical blanking region at the bottom of a frame of the programme signal;

30 wherein the pulse, and the first and second modulation signals are sufficient such that when the signal is copied by a recording device, interference is produced in the reproduction of the copied signal that is

not visible in the reproduction of an uncopied programme signal.

69. A modified picture signal according to claim 2 comprising picture information in lines of the programme  
5 signal that is amplified in respect to a corresponding unmodified programme signal, the amplified picture information being sufficient to increase the brightness of the signal such that the darkening effect of the pulse, and the first and second modulated signals is reduced.

10 70. A process for making an acceptable copy, or acceptable viewing of a copy of a video signal which has been modified or generated in accordance with any of claims 1 to 69, comprising removing or counteracting the effect of at least some of the added components so that an  
15 acceptable copy of the signal can be made on a video recorder or can be viewed.

71. A process according to any of claim 1 to 69, in which a synchronisation pulse is detected in the modified signal, and at a predetermined time following detection of  
20 the synchronisation pulse, means are activated for at least partially blanking one or more of the components added in accordance with Claim 72.

72. An apparatus for converting a signal which has been modified or generated in accordance with any of Claims 1  
25 to 69 so as to generate a signal of which acceptable copies can be made or which can be acceptably viewed after copying comprising a sync pulse separator, and means associated with the sync pulse separator for cancelling or reducing one or more components of the signal added in  
30 accordance with any of the preceding claims.